MANITOBA
STONE

MINERALS

ECONOMIC & REGIONAL DEVELOPMENT AGREEMENT

87-03831/

The initiation of this brochure is intended to attract wider interest by architects, builders, monument makers and resource developers in the stone industry of the Keystone Province, and also to provide a taste of the abundance and variety of its stone resources both developed and as yet untapped. To this end a small sampling of the attractive, easily accessible granite resources available for development is presented along with what is already available from active producers.

This project was funded under the Canada-Manitoba Mineral Development Agreement, a five year, $24.7 million program aimed at diversifying and strengthening the Manitoba mining industry.

Further information is available from:

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Canada

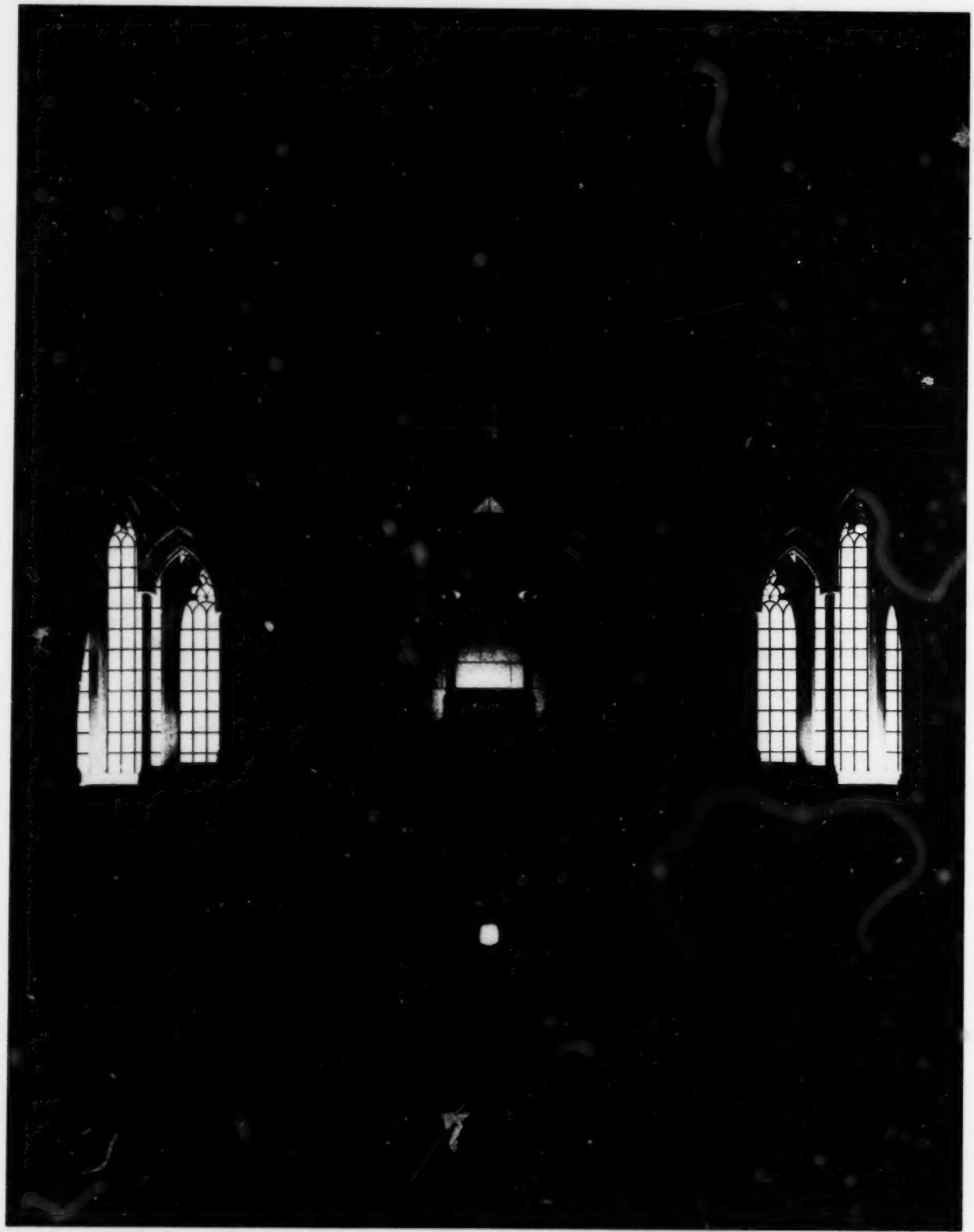
Manitoba

Almost every rock type the planet has to offer is to be found in the bedrock geology underlying Manitoba, aptly named "The Keystone Province." Crystalline Precambrian rocks of the Superior Province in southeastern Manitoba, are amongst the oldest on earth, dating isotopically up to 3 billion years in age. This accessible terrain is host to a broad range of igneous rocks—granites, monzonites, syenites, diorites, granodiorites, gabbros and many more, all referred to in the building stone trade as granites.

Granites occur as generally irregular masses from a few square kilometres to hundreds of square kilometres in area. They were formed by intrusion as liquids into pre-existing crustal formations where at depth they cooled slowly, crystallizing into solid rock. Subsequent buckling of the crust into mountain ranges followed by erosion through the chemical and mechanical action of air, water and ice over the region's long history, exposed the granite bodies at the surface as they occur today.

A variety of colours—red, pink, buff, white, grey, black, green, etc.—are due to the chemistry and mineralogy of the rock. In general, a low iron content yields lighter coloured stone. High iron and magnesia characterize the black granite. Colour, and uniformity of colour and texture are important aesthetic properties of the stone.

Contraction on cooling, and the later release of confining pressure on exposure to the surface, resulted in the generation of a more or less regular fracture pattern in the granites, referred to as joints. The spacing and orientation of these joints are important determinants of the suitability of a stone for quarrying. A system of two vertical joint sets at right angles coupled with horizontal "sheet" joints with average fracture spacing no less than four feet is ideal. Currently, there are two operating granite quarries in Manitoba. Coldspring Granite Quarries Ltd. near Lac du Bonnet and Shield Quarries of Canada east of Whitemouth produce red granites.



Interior of the Federal Parliament Buildings in Ottawa (Manitoba Tyndall stone).

Other Precambrian stone being produced in the region is derived from ancient sedimentary and volcanic rocks that have been metamorphosed by the intense heat and pressure of deep burial and complex folding during an era of mountain formation. Like the granites, these rocks have subsequently been exposed through erosion.

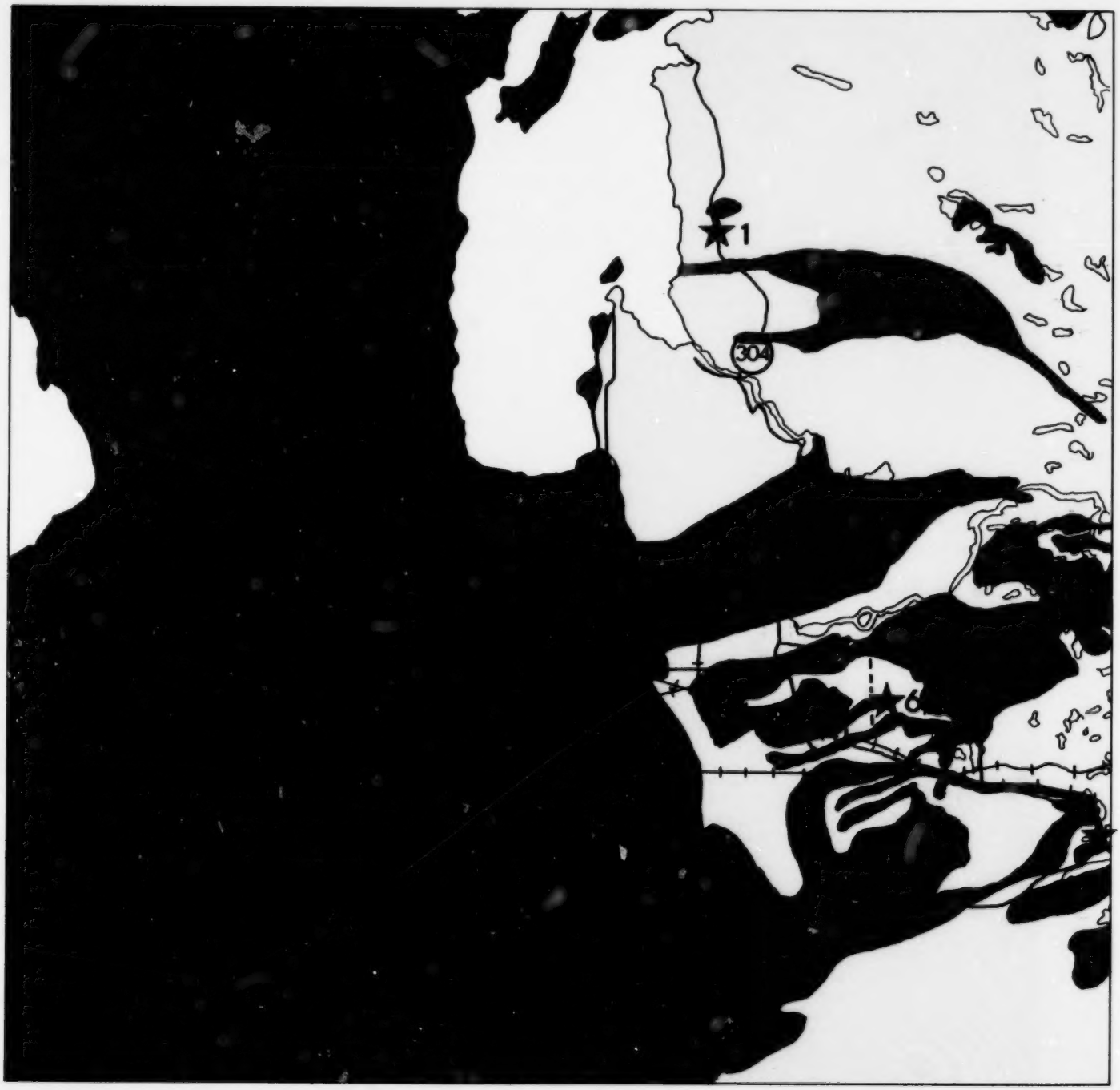
The original bedding planes of the stone and planar alignment of the constituent minerals through recrystallization under pressure, imparts a platy fracture pattern. This structure permits production of more or less flat plates that can be used as facing stone or building stones, walls, and fireplaces and as hearth patios, swimming pools, stairways and walkway flagstones. This stone is drawn from a number of quarries in southeastern Manitoba by Whiteshell Quarries Ltd. and a wide variety of colours and textures is available. Many have a metallic sheen resulting from an abundance of oriented mica flakes in the stone.

Westward, the Precambrian rocks are overlain by Paleozoic sedimentary rocks. The Red River Formation of Ordovician age contains a mottled dolomitic limestone called Tyndall stone. This famous fossil-bearing stone was formed as a sediment in a shallow sea 400 million years ago.

Natural chemical alteration in the stone gave rise to a unique lacy mottling pattern that gives Tyndall stone its distinctive charm. Two subtle colours are quarried: a light buff stone with pastel brown mottling and a pale grey, with a shade darker tone of mottling. The stone is available in rubbed, sawn, bushhammered, pointed, split, rustic and other finishes which add variety to the texture of the stone.

Tyndall stone was first quarried in 1832 to build Lower Fort Garry and has through the years, and to the present, been used in some of the most gracious buildings in Canada. Examples include: the interior of the Federal Parliament Buildings, Manitoba's Legislative Building, the Provincial Museum and Archives of Alberta, and the T.C. Douglas Building in Regina, Saskatchewan to mention a few. It is no exaggeration to say that Tyndall stone is an important part of Canada's heritage and with the large resources available this tradition is sure to continue for the foreseeable future.

Special Note:
Reported strengths of granites are based on a limited number of tests and may not be representative of commercial products.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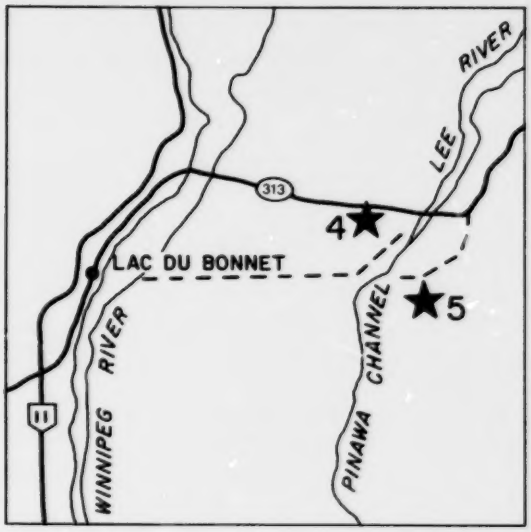
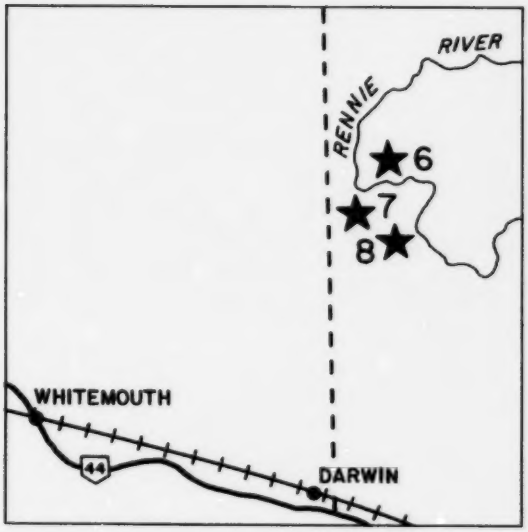
304

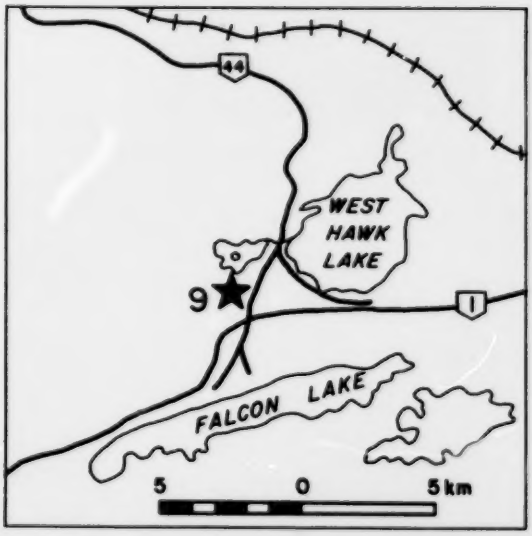
1 Black River White
2 Tyndall Stone
3 Colonial Rose





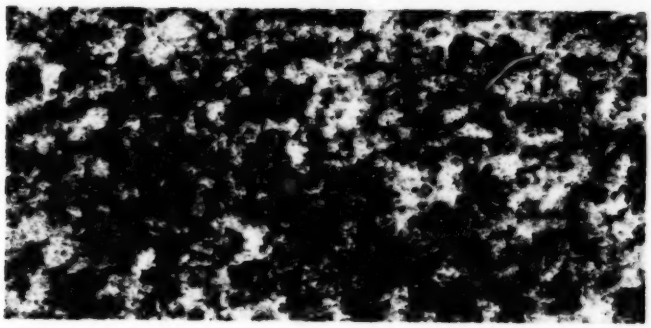
4 Lee River Orange
5 Pinawa Amber
6 Fairmont Mahogany

7 Emrose
8 Canada Rose
9 Winblack



Locations 1, 2, 3 are shown on map, page 4.

BLACK RIVER WHITE



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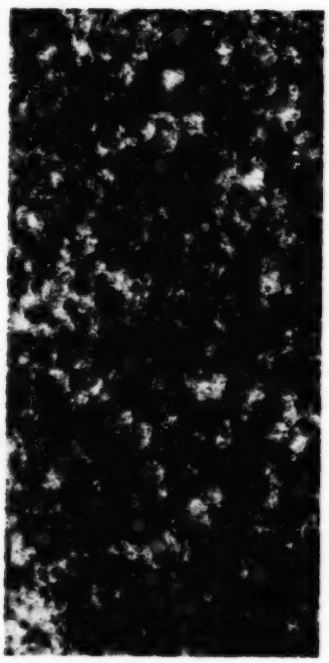
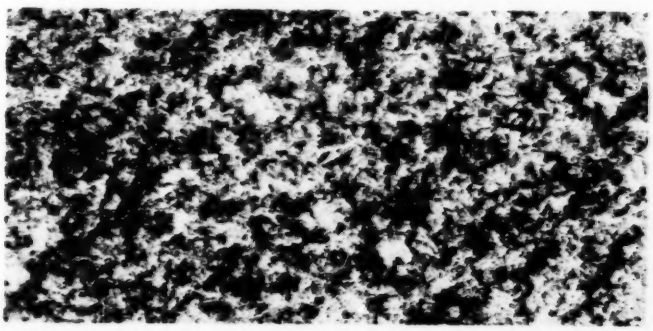


Polished

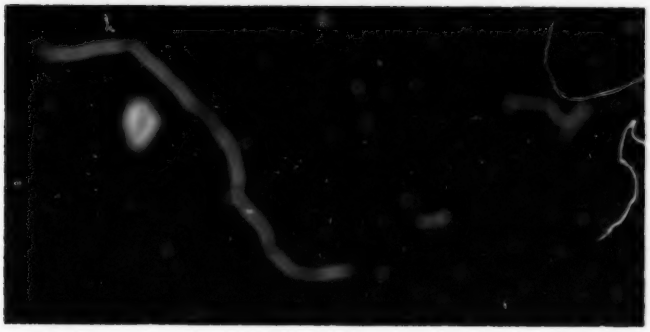
The Black River White granite is a light grey, biotite granite that is traversed by Highway 304 at Black River Indian Reservation, some 40 km north of Pine Falls. The rock is sparsely porphyritic with white feldspar laths 3 cm x 1 cm. The rock is not well exposed areally but a minimum of 100 hectares would appear to be available under shallow overburden. This attractive zone is undeveloped.

Unit Weight	164.11 lbs/ft^3 2626 kg/m^3
Absorption %	0.24
Dry Crushing Strength	32,500 lbs/in^2 224 MPa



Fired

EMROSE



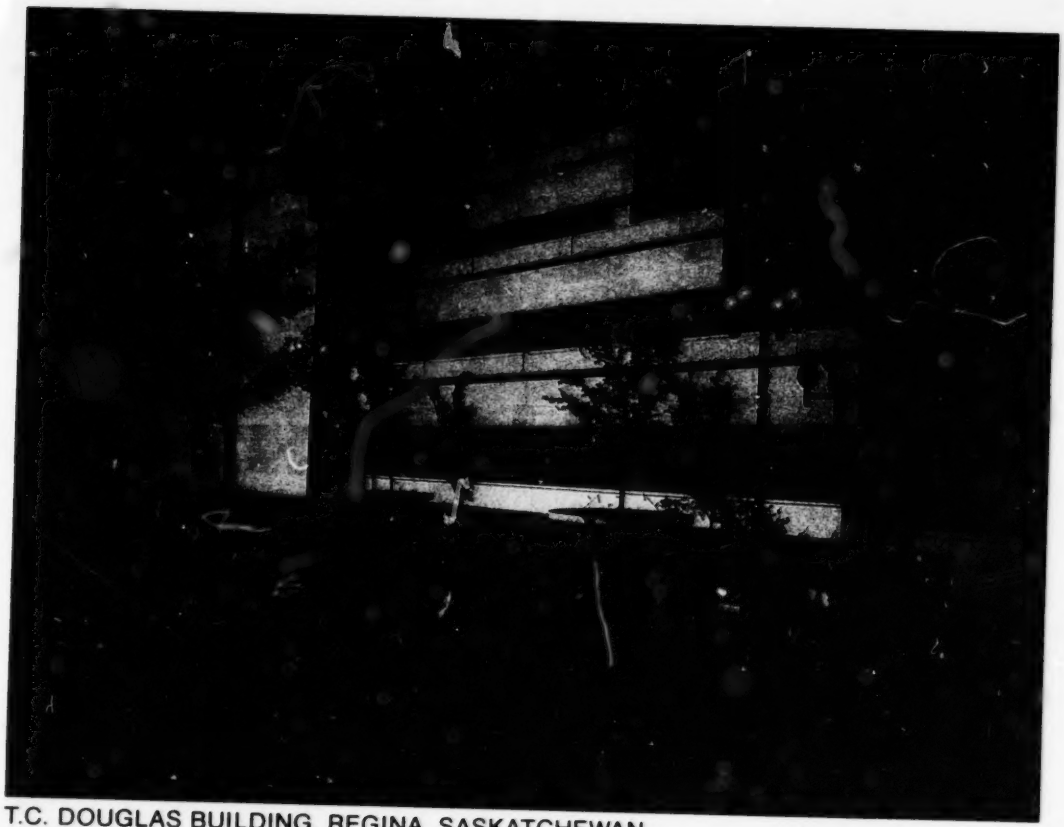
Honed

Polished

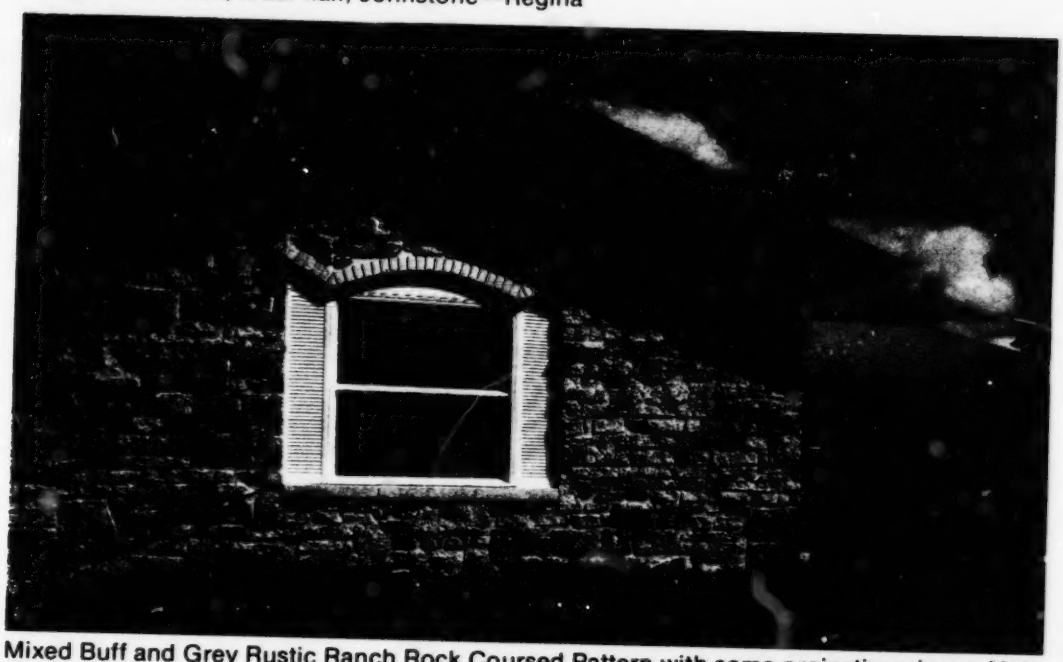
Emrose granite is a true red, biotite granite within the same band as Fairmont and Canada Rose. It features similar widely spaced fracture patterns. The resources are large and well exposed. No development work has been done at this site.

Unit weight	164.11 lbs/ft^3 2626 kg/m^3
Absorption %	0.24
Dry Crushing Strength	26,269 lbs/in^2 146 MPa

Fired



T.C. DOUGLAS BUILDING, REGINA, SASKATCHEWAN
Architects: Arnott, MacPhail, Johnstone—Regina



Mixed Buff and Grey Rustic Ranch Rock Coursed Pattern with some projecting pieces. Note cut stone window sill and trim.

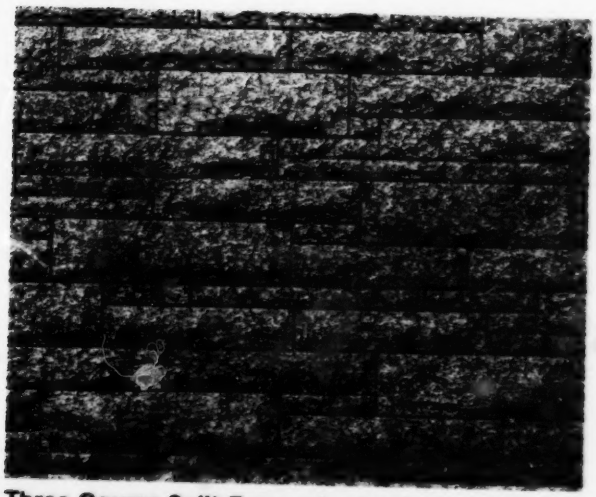
TYNDALL STONE

57 mm Course Split-Face, mixed colour

This distinctive stone is one of the best known in Canada. First used for the construction of Lower Fort Garry in 1832, it subsequently was selected for many of Canada's finest buildings including the Manitoba Legislature and the interior of the Federal Parliament Buildings. Tyndall stone is drawn from the upper mottled limestone of the Ordovician Red River Formation and occurs in two colours—a buff mottled and a pastel mottled grey.

The stone is presently quarried at Garson, 25 km northeast of Winnipeg on Highway 44, by Gillis Quarries Ltd. It has become popular in recent years in split-face and "Rustic Ranch Rock" styles for housing. The fresh appearance of the masonry in the 150 year old fort is testimony to the durability of this stone. Resources are very large.

Random Coursed Rustic Ranch Rock, mixed colour



Three Course Split-Face, mixed colour, pitched

Composition	
Calcite	85.18%
Magnesium Carbonate	13.03%
Unit Weight	152 lbs/ft^3 2500 kg/m^3
Absorption %	2.5
Dry Crushing Strength	7500-10,000 lbs/in^2 52-70 MPa

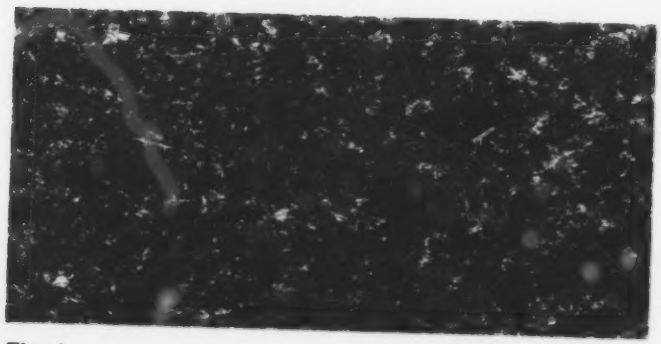
FAIRMONT MAHOGANY

Honed

Polished

Fairmont Mahogany granite is a rich brownish-red, medium grained, biotite granite, sparsely porphyritic with 1-2 cm long laths. Two main fracture sets occur averaging 3.4 m and 6 m spacings. Sheet fractures as seen on clefts vary from 0.5-2 m. Test quarrying has yielded blocks 1.3 m x 1.3 m x 2.5 m. Resources are large, the outcrop high and open and the property is inactive.

Unit Weight	164.32 lbs/ft^3 2629 kg/m^3
Absorption %	0.14
Dry Crushing Strength	29,196 lbs/in^2 201 MPa



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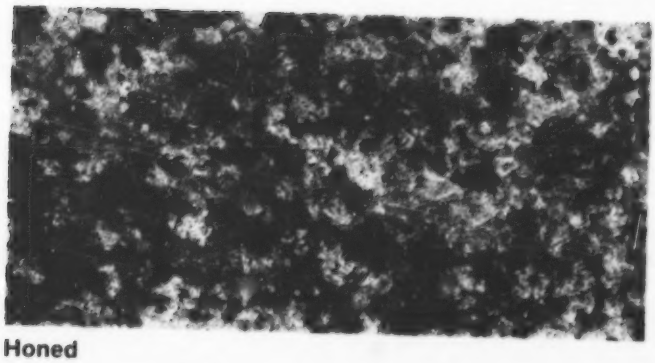
PINAWA AMBER

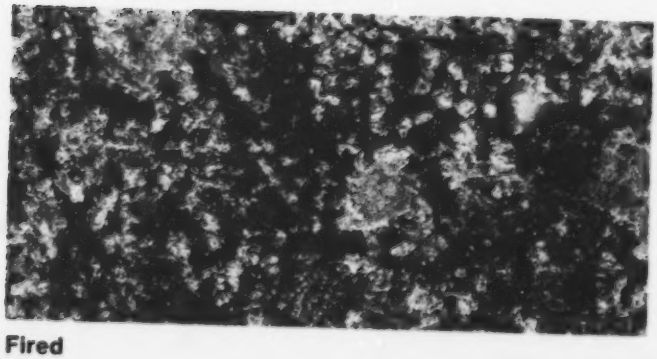


Honed

Polished

Pinawa Amber granite is a greyish, monzonitic, biotite granite with an unusual amber cast to the feldspar that imparts a warm pleasing tone. This distinctive stone is a phase of the extensive Lac du Bonnet Batholith. From work at the Underground Research Laboratory (URL), it would appear to underlie the red granite of the batholith "structurally." Three joint sets occur with spacings averaging 6 m, 8 m and 9 m and the first sheet joint lies 1.7 m below the top of the outcrop. Large blocks could be produced. This stone has yet to be exploited.

Unit Weight	164.11 lbs/ft^3 2626 kg/m^3
Absorption %	0.21
Dry Crushing Strength	28,500 lbs/in^2 197 MPa



Fired

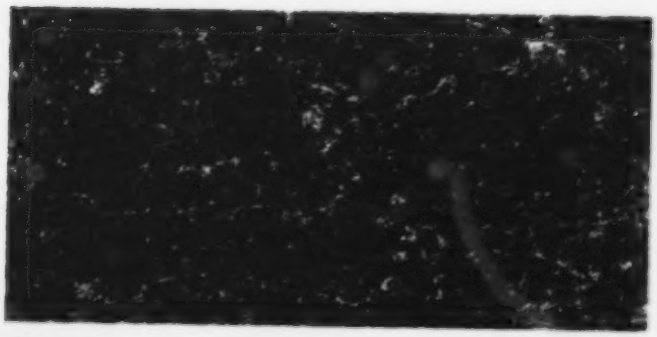
CANADA ROSE

Honed

Polished

Canada Rose granite is a red biotite granite having widely spaced fractures which permit the quarrying of large blocks. The deposit occurs in a narrow sill-like body 1-2 km long, extending from the Canadian National main line west of Elma to War Eagle Lake in Whiteshell Provincial Park. Shield Quarries of Canada Ltd.'s operation is 5 km north of Darwin, which is on the Canadian Pacific main line. Quarrying is done using the flame cutting method and blocks are shipped to Quebec for finishing.

Unit Weight	164.11 lbs/ft^3 2626 kg/m^3
Absorption %	0.17
Dry Crushing Strength	29,000 lbs/in^2 200 MPa



Fired

COLONIAL ROSE

Honed

Colonial Rose is a red, monzonitic, biotite granite with bluish quartz which is currently being quarried just south of Lac du Bonnet and west of Highway 11 by Coldspring Granite Ltd. The stone is remarkable for being almost free of joint fractures, a feature that makes possible the production of very large blocks. Located in the Lac du Bonnet Batholith, resources of Colonial Rose are very large. The company ships to customers both in Canada and the United States.

Unit Weight	164.74 lbs/ft^3 2636 kg/m^3
Absorption %	0.09
Dry Crushing Strength	32,600 lbs/in^2 225 MPa
Wet Crushing Strength	33,400 lbs/in^2 230 MPa

Polished

Fired

LEE RIVER ORANGE

Honed

Polished

Lee River Orange is a biotite, hornblende granite with a medium orangy-red colour that occurs in the Lac du Bonnet Batholith on the south side of Highway 313, 5 km east of the Winnipeg River crossing, north of Lac du Bonnet. Three fracture sets occur with average spacings of 1.7 m, 3 m and 4 m and the first sheet joint (horizontal) is 2 m below the top of the outcrop. The outcrop is large, open and topographically high. As yet there has been no production.

Unit Weight	164.11 lbs/ft^3 2626 kg/m^3
Absorption %	0.23
Dry Crushing Strength	33,000 lbs/in^2 228 MPa

Fired

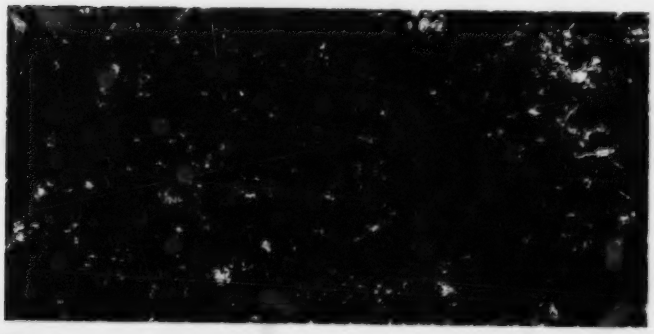
WINBLACK

Honed

Winblack is a black granite of gabbroic composition which occurs as a phase of the Falcon Lake Stock between Star and West Hawk Lakes. It is coarse grained and a pleasing texture is produced by translucent grey feldspar laths set in jet black matrix. The feldspar phenocrysts make up 50 per cent of the rock. An especially aesthetic result was achieved by firing this stone. Normally black granites are not fired because the surface tends to melt. For this stone, it would seem a worthwhile exercise. The feldspar laths spall along cleavages and the groundmass melts to a fine slaggy glass. The overall effect is to accentuate the gabbroic texture with pearly grey laths in a black glassy matrix. About 1,000 tonnes of the rock were quarried but there has been no activity at the site for over 30 years.

Unit Weight	178.46 lbs/ft^3 2855 kg/m^3
Absorption %	0.05
Dry Crushing Strength	29,460 lbs/in^2 203 MPa

Polished



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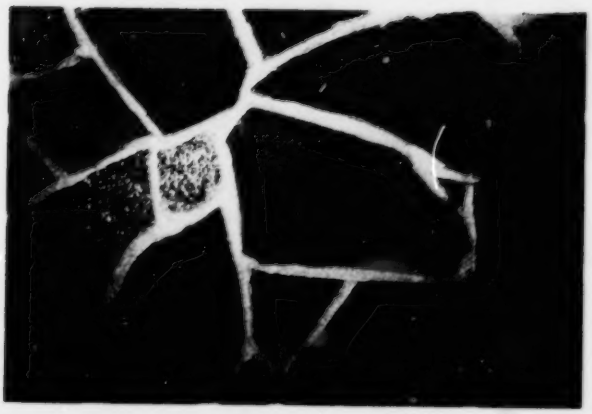
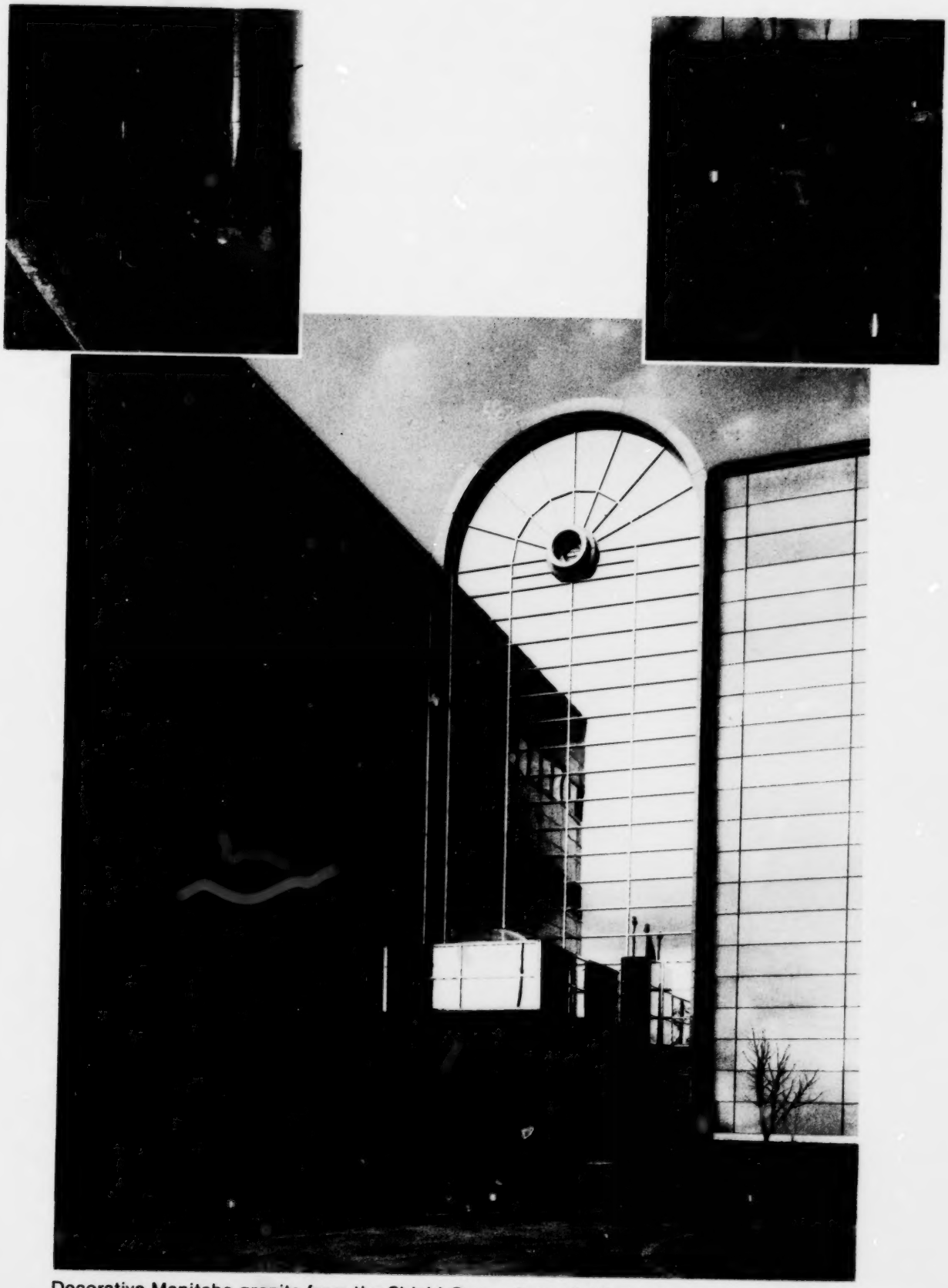
WHITESHELL QUARRIES LTD.



Whiteshell Quarries Ltd. produces attractively platy stone of metasedimentary, metavolcanic and igneous origin from several localities in southeastern Manitoba. Several types exhibit a natural glossy iridescence imparted by abundant mica flakes on cleavage surfaces. The material is popular as a facing stone for houses, office buildings, walls, gateways, fireplaces, hearths, patios and swimming pools. The company sells in Canada and the northern United States.

THE COVER

Front Cover: Designed by Agricola Mineralia; crafted in Tyndall Stone and the eight granites from the brochure by Henry Ehm of Whitemouth Quarries; crocuses courtesy of Travel Manitoba.



Decorative Manitoba granite from the Shield Quarry is used effectively on the new National Research Council Building in Winnipeg.